IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Thomas Robieu et al.
Serial No:	10/711,950
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Title:	Overload Protection Device and Machine Tool Having Such Overload Protection Device
Examiner:	Nathaniel C. Chukwurah
Art Unit:	3721

Commissioner for Patents

Alexandria, VA 22313-1450

ARGUMENTS ACCOMPANYING
PRE-APPEAL BRIEF REQUEST FOR REVIEW

Claims 1-5, 7-9, 14 and 17 are rejected under 35 USC 103(a) as being unpatentable over UK 1,095,065 and Nickel et al. (US 4,635,777).

Please note that claim 7 was canceled (8/22/06). Claim 1 defines a portable device with overload protection device having a drum and a coupling that engages the drum under the effect of centrifugal force. A special feature is that the **drum is arranged on the drive side** of the device and the **centrifugally acting coupling is arranged on the driven side**, i.e., on the output shaft that acts on the tool. The gist of the invention can best be understood when looking at Figs.1 and 2 and paragraphs 75 to 78 of the specification.

The inventive arrangement does not act as a centrifugal clutch in the conventional sense where coupling is effected above a predetermined minimal engine speed. The minimal friction acting between the fly bodies of the output shaft and the drum on the drive shaft ensures that the tool, when free of load, can be accelerated when the motor is started. The entrainment of the output shaft by minimal friction causes centrifugal forces to be generated at the output shaft and, above a certain speed, the centrifugal forces are great enough to drive the tool. On the other hand, the overload protection of the coupling happens only when the tool is blocked or under too great a load. The braking moment on

the tool is transmitted onto the output shaft and the attached fly bodies; the fly bodies now slip relative to the driven drum. As the tool and output shaft are stopped, the fly bodies are no longer subject to centrifugal force; however, the motor, motor shaft, and drum can still rotate. The elimination of centrifugal force acting on the fly bodies leads to instant decoupling without this requiring a braking action of the motor side and the drum. The overload protection according to the invention acts as a safety device substantially without any delay because the drive motor can continue to run.

A complete separation between the drive side and the driven side is actually realized. When the operator starts the motor while the tool is blocked, the motor including the drum can rotate freely without entraining the fly bodies that are stopped by the blocked tool and therefore not subject to any centrifugal force. This arrangement therefore causes no or only minimal frictional heat. Overloading of the arrangement is prevented.

GB 1,095,068 shows a grinding device with overload protection in which the torque transmission from motor to driven tool shaft is realized by a friction plate 14. The friction plate 14 is pressed by means of dished springs 17 against the end face of the wheel 12. When the tool is subjected to overload or is blocked, the tool spindle 5 and the friction plate 14 slip relative to the wheel 12; see page 2, lines 32-38. This overload protection is based on axial pressure applied by the springs 17 and causing the plate 14 to be pressed against the wheel 12. There is no centrifugal force (centrifugal force by definition acts radially) for affecting the coupling action: only axial pressure is applied and the friction between friction surface 16 and wheel 12 generates rotational engagement. There is no drum and no coupling that is forced by centrifugal force against the drum. In particular, there are **no coupling elements provided at the driven side** which coupling elements **act under centrifugal force** on a drum provided on the drive side.

This arrangement corresponds to the prior art discussed in paragraph 6 of the instant specification. The friction connection between drive side and driven side is permanent even in the blocking situation. When the drive motor is not immediately switched off, the slipping movement between the plate 14 and the wheel 12 causes great friction and leads to overheating and excessive wear.

Examiner states that *Nickel et al.* shows coupling 4, 5 "forced against the drum by centrifugal force generated by rotation of the **output shaft** so as to engage the drum"

(emphasis added). Examiner refers to col. 2, lines 59-68. According to col. 2, lines 52ff, the clutch drum 2 is seated on the drive shaft of the motor so as to permit relative rotation between clutch drum 2 and drive shaft, i.e., the drum is not fixedly mounted on the drive shaft. However, the rotor 3 is fixedly fastened to the drive shaft (col. 2, lines 57-58) - not to the output shaft as stated by the examiner- so that, when the drive shaft rotates, the rotor 3 and the weights 4, 5 mounted thereon move radially outwardly to engage the drum 2. This is the typical design of a centrifugal clutch as it is commonly used in the art.

The examiner argues that it would be obvious to modify the device of *UK 1,095,065* by employing the centrifugal clutch of *Nickel*. When a centrifugal clutch as taught by *Nickel* is used in the device of *UK 1,095,065*, the rotor and weights would be mounted on the drive shaft of the motor and the drum on the output shaft connected to the tool. According to the present invention, the drum is drivingly connected to the drive shaft (driven by the drive pinion connected to the drive shaft; claim 1) and the centrifugal coupling elements are connected to the output shaft. Thus, the clutch of *Nickel* mounted in a device of *UK 1,095,065* leads to an arrangement that is reverse to the arrangement claimed in claim 1.

It is not obvious to reverse the clutch of *Nickel* when mounting it in a device of *UK 1,095,065*. The clutch is designed such that the weights 4, 5 will engage the drum only when a predetermined rotational speed has been reached (see col. 2, lines 59-63). When reversing the arrangement, i.e., drivingly connecting the drum to the drive shaft of the engine, the clutch would never engage because the weights connected to the output shaft will never be centrifugally advanced against the drum - they cannot be initially entrained as in the present invention where a spring force provides a minimal initial friction; they require a certain centrifugal force caused by rotation of the shaft to which they are connected in order to be moved radially outwardly for engagement but there are no means for effecting rotation of the output shaft. Moreover, there is no suggestion whatsoever in the references to attempt such a reverse arrangement. The subject matter of the claim 1 is therefore not obvious in view of *UK 1,095,068* and *Nickel*.

Reconsideration and withdrawal of the rejection of the claims 1-5, 8-9, 14, 17 pursuant to 35 USC 103 are therefore respectfully requested.

Claims 18-20, 23, 26 stand rejected under 35 USC 103(a) as being unpatentable over Bidanset (US 3,982,616).

The examiner argues that the cited reference discloses the claimed subject matter "except the drum (5) and the at least one fly body mounted in the drive train between the motor and the gearbox; wherein the drum is arranged at an input side of the drive train and the at least one fly body is arranged at an output side of the drive train". In examiner's opinion modification of the design of *Bidanset* is simply a matter of design choice since applicant has not disclosed that any stated problem is solved by the inventive arrangement.

Applicant disagrees: special advantages of the present invention are discussed in particular in paragraph 38 of the instant specification. Reference is further being had to the above detailed discussion of the special technical features of the present invention.

Briefly stated, the actual function of the overload protection according to the invention occurs especially when the tool is blocked. The braking moment of the tool exerted onto the output shaft causes the fly bodies to slip relative to the drum and this causes the output shaft to stop. The fly bodies are no longer subject to centrifugal force, but the motor can still drive motor shaft and drum. The elimination of centrifugal forces acting on the fly bodies leads to an immediate decoupling without this requiring that the motor side and the drum must be braked. A further advantage is the complete separation between the drive side and the driven side. When the operator starts the motor while the tool is blocked, the motor including the drum can rotate freely; the fly bodies are stopped because of the tool blockage and not subjected to any centrifugal force. This arrangement therefore causes no or only minimal frictional heat. Overloading of the arrangement is prevented. This is not suggested or taught in the cited reference.

Bidanset (Fig. 4) discloses a centrifugal clutch that functions in a way well known in the art. The weights 6b, 11 are arranged on the motor side (input side) and rotated by the drive motor. The drum 5 is arranged on the driven side (output side or tool side). When the drive motor has reached a certain engine speed, the fly bodies 6b, 11 of the drive side frictionally engage the wall 5a of the coupling drum so that the shaft 1 begins to rotate. This is the basic principle of a centrifugal clutch as disclosed also in *Nickel* discussed supra.

The arrangement of *Bidanset* has a function that is completely different from the function of the overload protection device of the present invention. When overload or blocking of the tool occurs in *Bidanset*, the engine speed of the drive shaft 1 is reduced including that of the coupling drum 5. The fly bodies 6b, 11 remain however still engaged

on the circumferential wall 5a of the coupling drum 5 and must also be braked. Since the fly bodies are connected to the drive shaft at the motor side, the motor must be braked also. Blockage of the tool requires that the complete drive train, including the motor, must be braked. The arrangement requires the entire drive train to be slowed down until in the end the rotary speed of the motor shaft drops below coupling speed. This causes a significant loading of the entire drive train. Since all of the rotating masses must be braked, the braking process takes a long time and no instantaneous decoupling is possible.

A further disadvantage of the device of *Bidanset* is observed when the motor is still running even though the tool is braked or blocked. The drive motor continues to drive the fly bodies 6b, 11 so that, under the effect of centrifugal force, they rest against the wall 5a of the drum 5 and cause great friction leading to overheating and untimely wear.

In summarizing the above, the important feature of the present invention resides in that the drum is arranged on the drive side (motor side) while the coupling bodies (fly bodies) are positioned on the driven side (tool side). Only this type of arrangement enables an immediate and delay-free decoupling action when the tool is blocked and a subsequent permanent decoupling (the motor is still running!), thus preventing overload. This technical feature is not proposed or suggested by *Bidanset*.

Claims 18 and 26 are thus not obvious in view of the cited reference to *Bidanset*.

It is therefore respectfully requested that the rejection of claims 18-20, 23-24, and 26 under 35 USC 103 be withdrawn and that the application be passed to issue.

Respectfully submitted on January 9, 2007,

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